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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/584,739	06/01/2000	Kuniko Kikuta	PF-2622/NEC/US/mh	3028

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EXAMINER

QUACH, TUAN N

ART UNIT PAPER NUMBER

2814

DATE MAILED: 12/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/584,739

Applicant(s)

KIKUTA, KUNIKO

Examiner

Tuan Quach

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 and 57-63 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-37 and 57-63 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action. Also, the "et al" in a reference's name is omitted.

Claims 1-37 and 57-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edelstein or Dubin taken with any of Kato, Oyama, Yamasaki, or and further in view of Tsuji et al.

Edelstein teaches copper alloys, e.g., column 6 line 10 to column 8 line 50 wherein copper alloys including various materials, e.g., B, P, Ni, Ag, and various and various metals, such as Mo, W, Si, Ge, Ta, to obtain improved electromigration resistance. Alloys such as Cu(Ti) are also delineated. See column 8 line 29-32. Application of such materials on the via hole in semiconductor devices is also shown.

Dubin teaches the use of copper alloys including in via contact holes, e.g., trench 12, including barrier 52, e.g., column 7 lines 7-21, including alloy layers 56, 57, the alloys being suitable Cu alloys including alloys of Cu with any of various metals, wherein the alloys can also include various alloying elements. See column 5 line 30 to column 6 line 50.

Kato (63-262437) teaches copper alloy having high electroconductivity including Sb, e.g., 0.5%. See the abstract.

Oyama (3-285,035) teaches copper alloys having excellent migration resistance including Ti of 0.1 to 1.0%. See the abstract.

Yamazaki also teaches copper alloy having excellent heat and electrical conductivity wherein appropriate amount of metal such as Ti, e.g., 0.05 to 1% is optimized. See the abstract, column 2 lines 23-25.

Tsuji teaches the inclusion of various elements including P, Ni, Ag, B, As, Si, Cr and appropriate amounts, e.g., see the abstract column 4 lines 26-69, Tables 1 and 2, column 6 lines 65-66, to obtain alloys having excellent conductivity and heat resistance. The selection of appropriate amounts is also shown, e.g., column 4 lines 37-58 wherein such optimization, e.g., regarding conductivity is also shown.

It would have been obvious to one skilled in the art in practicing Dubin and Edelstein to have employed suitable copper alloys including the various elements claimed to suitable amounts since such alloys are conventional and advantageous where appropriate amounts would result in improved copper alloys as evidenced by Kato, Oyama, Yamazaki, and Tsuji. The selection and optimization of appropriate amounts would have been further obvious given the teachings of appropriate amounts as shown in Kato, Oyama, and Yamazaki where the amounts anticipating or rendering obvious the amounts claimed, and further would have been obvious, and as delineated in Tsuji wherein decrease in conductivity can be prevented. The copper alloys having lower melting point would have been obvious and inherent given that the appropriate amount of alloying materials is employed.

Applicant's arguments with respect to claims 1-37 and 57-62 have been considered but are moot in view of the new ground(s) of rejection.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Quach whose telephone number is 703-308-1096. The examiner can normally be reached on M - F from 9 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Wael Fahmy can be reached on (703) 308-4918. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318 (Before Final) and (703) 872-9319 (After Final).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Tuan Quach
Primary Examiner